

## CLAIMS

1. A gene consisting of at least one of the following definitions correlated with prediction of the postoperative prognosis of breast cancer;

5        1) a marker gene group capable of establishing classification of genes from breast cancer patients died within 5 years after a surgical operation (5y-D group) and genes from patients survived free of disease for several years or more after the operation (5y-S group), depending on their expression functions, in estrogen receptor-negative breast cancer,

2) a marker gene group capable of establishing classification of genes from n0 breast  
10 cancer patients recurred within 5 years after an operation (5Y-R group) and genes from patients survived free of disease for 5 years or more after the operation (5Y-F group), depending on their expression functions, in (node-negative)(n0) breast cancer with no metastasis to a lymph node in the operation,

3) a marker gene group capable of establishing classification of genes from breast  
15 cancer patients died within 5 years after a surgical operation (5D group) and genes from patients survived free of disease for several years or more after the operation (5S group), depending on their expression functions, in primary breast cancer.

2. A gene selected from the following sequences correlated with prediction of the postoperative prognosis of primary breast cancer;

20 pro-alpha-1 type 3 collagen (PIIIP),  
complement component C1r,  
dihydropyrimidinase-like 3 (DPYSL3),  
protein tyrosine kinase 9-like (PTK9L),  
carboxypeptidase E (CPE),  
25 alpha-tubulin,  
beta-tubulin,  
heat shock protein HSP 90-alpha gene,  
malate dehydrogenase,

NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 3 (NDUFB3).

3. A gene selected from the following sequences highly expressed in a group of good prognosis correlated with prediction of the postoperative prognosis of primary breast cancer; pro-alpha-1 type 3 collagen (PIIP),

- 5 complement component C1r,
- dihydropyrimidinase-like 3 (DPYSL3),
- protein tyrosine kinase 9-like (PTK9L),
- carboxypeptidase E (CPE),
- alpha-tubulin,
- 10 beta-tubulin.

4. A gene selected from the following sequences highly expressed in a group of bad prognosis correlated with prediction of the postoperative prognosis of primary breast cancer; heat shock protein HSP 90-alpha gene,

malate dehydrogenase,

- 15 NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 3 (NDUFB3).

5. A gene selected from the following sequences correlated with prediction of the postoperative prognosis, in (node-negative)(n0) breast cancer with no metastasis to a lymph node in operation;

AF058701/ DNA polymerase zeta catalytic subunit (REV3),

- 20 AI066764/ lectin, galactoside-binding, soluble, 1 (galectin 1),

x15940/ ribosomal protein L31.,

Hs.94653/ neurochondrin (KIAA0607),

M13436/ ovarian beta-A-inhibin,

Hs.5002/ copper chaperone for superoxide dismutase; CCS,

- 25 D67025/ proteasome (prosome, macropain) 26S subunit, non-ATPase, 3,

M80469/ MHC class I HLA-J gene,

Hs.4864/ ESTs,

Hs.106326/ ESTs.

6. A gene selected from the following sequences highly expressed in a group of bad prognosis correlated with prediction of the postoperative prognosis, in (node-negative)(n0) breast cancer with no metastasis to a lymph node in operation;

AF058701/ DNA polymerase zeta catalytic subunit (REV3),

- 5 AI066764/ lectin, galactoside-binding, soluble, 1 (galectin 1),  
x15940/ ribosomal protein L31.

7. A gene selected from the following sequences highly expressed in a group of good prognosis correlated with prediction of the postoperative prognosis, in (node-negative)(n0) breast cancer with no metastasis to a lymph node in operation;

- 10 Hs.94653/ neurochondrin (KIAA0607),  
M13436/ ovarian beta-A-inhibin,  
Hs.5002/ copper chaperone for superoxide dismutase; CCS,  
D67025/ proteasome (prosome, macropain) 26S subunit, non-ATPase, 3,  
M80469/ MHC class I HLA-J gene,  
15 Hs.4864/ ESTs,  
Hs.106326/ ESTs.

8. A gene selected from the following sequences correlated with prediction of the postoperative prognosis, in estrogen receptor-negative breast cancer;

Hs.108504/ FLJ20113/ ubiquitin-specific protease otubain 1

- 20 Hs.146550/ MYH9/ myosin, heavy polypeptide 9, non-muscle

Hs.194691/ RAI3/ retinoic acid induced 3

Hs.1975/ TDRD3/ tudor domain containing 3

Hs.203952/ TRRAP/ transformation/transcription domain-associated protein

Hs.278607/ GSA7/ ubiquitin activating enzyme E1-like protein

- 25 Hs.429/ ATP5G3/

ATP synthase, H<sup>+</sup> transporting, mitochondrial F<sub>0</sub> complex, subunit c (subunit9) isoform3

Hs.75305/ AIP/ aryl hydrocarbon receptor interacting protein

Hs.81170/ PIM1/ pim-1 oncogene

Hs.99987/ ERCC2/

excision repaircross-complementingrodentrepairdeficiency,  
complementationgroup2

5 Y12781/ Transducin (beta) like 1 protein

Hs.104417/ KIAA1205 protein

cl.21783/ Hypothetical protein

Hs.112628/ Hypothetical protein: MGC43581

Hs.170345/ Hypothetical protein FLJ13710

10 Hs.53996/ weakly similar to zinc finger protein 135

Hs.55422/ Hypothetical protein

Hs.112718/ EST

Hs.115880/ EST

Hs.126495/ EST.

15 9. A gene selected from Claim 8, as a gene highly expressed in a group of bad prognosis.

10. A probe specific to the gene according to any one of Claims 1 to 9.

11. A DNA microarray carrying thereon the gene and/or probe according to any one of Claims 1 to 10.

20 12. The microarray according to Claim 11, wherein the DNA microarray is a fiber type microarray.

13. A method of inspecting the postoperative prognosis of breast cancer using as a marker the gene and/or probe according to any one of Claims 1 to 10.

25 14. A method of inspecting the postoperative prognosis of breast cancer using the microarray according to Claim 11 or 12.

15. A method of screening cancer therapeutic medicines for controlling the postoperative prognosis of breast cancer using as a marker the gene and/or probe according to any one of Claims 1 to 10.

16. A method of screening cancer therapeutic medicines for controlling the postoperative prognosis of breast cancer using the microarray according to Claim 11 or 12.

17. A diagnosis kit for the postoperative prognosis of breast cancer containing a reagent using as a marker the gene and/or probe according to any one of Claims 1 to 10.

5 18. The diagnosis kit according to Claim 17, wherein the kit comprises a microarray.

19. The diagnosis kit according to Claim 18, wherein the microarray is a fiber type microarray.